* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Device]
[0012]
After making this design in view of such a conventional technical problem, mixing the refrigerant which went via the evaporator for freezer compartments, and the refrigerant which went via the evaporator for cold storage and raising a pressure, by supplying a compressor A single-loop cycle applicable not only to a mixed refrigerant but a pure refrigerant is constituted, and it aims at offering the freezer of the refrigerator which has two evaporators which can maximum-ize energy efficiency the minimum costs.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Field of the Invention]
[0001]
After it starts the freezer of the refrigerator equipped with two evaporators, it is mixed while the refrigerant which went via the evaporator for freezer compartments, and the refrigerant which went via the evaporator for cold storage went via the ejector in detail, and this design is staged on a pressure, it is related with the freezer of the refrigerator equipped with two evaporators characterized by supplying a compressor.

[Translation done.]

This Page Blank (uspto)

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem]
[0013]
In the freezer of the refrigerator equipped with two evaporators concerning this design in order to attain such a purpose The compressor into which a refrigerant is made to compress, and the condenser which makes the refrigerant compressed by said compressor condense, An expansion means for freezer compartments to make the 1st pressure decompress the refrigerant condensed by said condenser, An expansion means for cold storage to make the 2nd pressure decompress the refrigerant condensed by said condenser, The evaporator for freezer compartments which makes the 1st temperature cool the air which is made to evaporate the refrigerant which expanded with said expansion means for freezer compartments, and is supplied to a freezer compartment, The evaporator for cold storage which makes the 2nd temperature cool the air which is made to evaporate the refrigerant which expanded with said expansion means for cold storage, and is supplied to cold storage, After mixing the refrigerant which went via said evaporator for freezer compartments, and the refrigerant which went via said evaporator for freezer compartments and raising a pressure, the ejector supplied to said compressor is included and it is constituted.

[Translation done.]

This Page Blank (uspto)

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

EFFECT OF THE INVENTION

[Effect of the Device]
[0014]
After mixing with an ejector the refrigerant which went via the evaporator for freezer compartments, and the refrigerant which went via the evaporator for cold storage in the freezer of the refrigerator equipped with two evaporators concerning this design and raising a pressure so that it may explain below, in order to supply a compressor, a single-loop cycle applicable to a pure refrigerant is constituted, and it is effective in the ability to be able to maximum-ize energy efficiency with the minimum manufacturing cost.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed explanation of a design]
[Field of the Invention]
[0001]
After it starts the freezer of the refrigerator equipped with two evaporators, it is mixed while the refrigerant which went via the evaporator for freezer compartments, and the refrigerant which went via the evaporator for cold storage went via the ejector in detail, and this design is staged on a pressure, it is related with the freezer of the refrigerator equipped with two evaporators characterized by supplying a compressor.
[Background of the Invention]
[0002]
The compressor 1 which is made to compress a refrigerant and is transformed to the steamy condition of elevated-temperature high pressure as the freezer of a refrigerator was conventionally shown in drawing 5 , The condenser 2 which raises the temperature of the air of said perimeter at the same time it makes high-pressure liquefied voice condense by carrying out heat exchange of the refrigerant which changed into the steamy condition of elevated-temperature high pressure with this compressor 1 to surrounding air, The expansion device 4 transformed to the condition of making the refrigerant which changed into the high-pressure liquid condition with this condenser 2 decompressing, and being easy to evaporate, While making it change into the steamy condition of low-temperature low voltage by carrying out heat exchange of the refrigerant which went via said expansion device 4 to surrounding air, the evaporator 5 to which the temperature of the air of said perimeter is dropped was included, and it was constituted.
[0003]
Here, said compressor 1 and condenser 2 were contained by the machine room (un-illustrating) of a refrigerator, and ********** wearing was carried out at the one side of said condenser 2 with the motor 7 which supplies power to the heat dissipation fan 3 and this heat dissipation fan 3 for making this condenser 2 radiate heat.
Moreover, ********** wearing of said evaporator 5 was carried out with the motor 10 which the back side of the freezer compartment 8 of a refrigerator is equipped with, supplies cold to said freezer compartment 8 and cold storage 9, and supplies power to the frozen fan 6 and this frozen fan 6 for carrying out endoergic [of this evaporator 5] to the one side of said evaporator 5.
[0004]
Hereafter, based on drawing 6 , it explains to actuation of the freezer of the conventional refrigerator constituted in this way.
First, the refrigerant of the low-temperature low voltage condition a which flowed into the compressor 1 is compressed by said compressor 1, changes to the steamy condition b of elevated-temperature high pressure, and is inhaled by the condenser 2, and this condenser 2 emits heat and changes the refrigerant of said elevated-temperature high pressure to the liquefied voice c or cf of ordinary temperature high pressure.
subsequently, the part decompresses the refrigerant of ordinary temperature high pressure condensed by said condenser 2, going via the expansion device 4 -- having -- etc. -- it expands in enthalpy and a liquid and a gas will be 2 phase mixed [d].
[0005]

This Page Blank (uspto)

Subsequently, the refrigerant d of said 2 phase condition inhaled by the evaporator 5 is evaporated completely, changes to the low-temperature low voltage conditions a or ag, takes surrounding heat in this process, and makes a perimeter cool.
Subsequently, since the air cooled with said evaporator 5 flows into a freezer compartment 8 and cold storage 9 via a cold duct (un-illustrating) and a flow regulator (un-illustrating), respectively, these freezer compartments 8 and cold storage 9 can maintain -18 degrees C and -4 degrees C, and the fixed temperature, respectively.
[0006]
However, it sets to the freezer of such a conventional refrigerator. one evaporator installed in the back side of a freezer compartment -- using it -- a freezer compartment and cold storage -- ******, in order to make it cool at temperature Since it was necessary to double the evaporation pressure of the refrigerant in said evaporator with the pressure applicable to the saturation temperature of a freezer compartment lower than the temperature of cold storage, the differential pressure between an evaporator and a condenser became large, the compressor changed into the overload condition, and there was an inconvenient point that the energy efficiency of a refrigerator fell.
[0007]
And in the freezer of the conventional refrigerator, it was the process which distributes and supplies the air cooled with said evaporator to a freezer compartment and cold storage, and since mutual mixing of the air of these freezer compartments and cold storage was carried out, the moisture of cold storage and the smell of food flowed into the freezer compartment, and there was an inconvenient point that the amenity inside a refrigerator fell.
[0008]
Moreover, in the freezer of the conventional refrigerator, in order that the moisture which flowed from cold storage might form **** on the front face of an evaporator with very low temperature, while the heat transfer effectiveness of said evaporator fell, there was an inconvenient point of decreasing the airflow which goes via said evaporator.
[0009]
Furthermore, in the freezer of the conventional refrigerator, in order to have defrosting equipment which usually uses an electric heater in order to remove **** formed on the surface of an evaporator, as mentioned above, in order that the power consumption of this electric heater might occupy about about 5 - 10% of the power consumption of the whole refrigerator, there was an inconvenient point that equipment effectiveness fell.
The freezer equipped with two evaporators was developed as a casting plan for solving the above troubles, and the double loop-formation cycle and the single-loop cycle were mentioned as the typical example.
[0010]
It is alike and sets in said double loop-formation cycle. being appropriate -- Although it is advantageous in respect of energy efficiency in order that it was constituted by two independent freezers which have mutually different evaporation temperature, and a high evaporation pressure may occur, differential pressure with a condenser may decrease in the cycle of cold storage and the loads of a compressor may decrease in number remarkably Since it was necessary to use every two of of said compressor and evaporator, respectively, there was an inconvenient point that the manufacture unit price of equipment rose and use nature fell.
[0011]
Moreover, it sets in the single-loop cycle represented as a Lorentz MOITSUNA cycle (Lorent-Meutzner cycle). It is what uses one compressor and two evaporators. One evaporator An additional ********** sake, Inconvenient ******** of having the first-thing-to-do technical problem that it is necessary to spread this mixed refrigerant cheap after developing an usable mixed refrigerant since it is applicable only to a mixed refrigerant although the problem of the use nature fall by the increment in a manufacture unit price is solvable.
[An indication of a design]
[Problem(s) to be Solved by the Device]
[0012]
After making this design in view of such a conventional technical problem, mixing the refrigerant

which went via the evaporator for freezer compartments, and the refrigerant which went via the evaporator for cold storage and raising a pressure, by supplying a compressor A single-loop cycle applicable not only to a mixed refrigerant but a pure refrigerant is constituted, and it aims at offering the freezer of the refrigerator which has two evaporators which can maximum-ize energy efficiency the minimum costs.

[Means for Solving the Problem]

[0013]

In the freezer of the refrigerator equipped with two evaporators concerning this design in order to attain such a purpose The compressor into which a refrigerant is made to compress, and the condenser which makes the refrigerant compressed by said compressor condense, An expansion means for freezer compartments to make the 1st pressure decompress the refrigerant condensed by said condenser, An expansion means for cold storage to make the 2nd pressure decompress the refrigerant condensed by said condenser, The evaporator for freezer compartments which makes the 1st temperature cool the air which is made to evaporate the refrigerant which expanded with said expansion means for freezer compartments, and is supplied to a freezer compartment, The evaporator for cold storage which makes the 2nd temperature cool the air which is made to evaporate the refrigerant which expanded with said expansion means for cold storage, and is supplied to cold storage, After mixing the refrigerant which went via said evaporator for freezer compartments, and the refrigerant which went via said evaporator for freezer compartments and raising a pressure, the ejector supplied to said compressor is included and it is constituted.

[Effect of the Device]

[0014]

After mixing with an ejector the refrigerant which went via the evaporator for freezer compartments, and the refrigerant which went via the evaporator for cold storage in the freezer of the refrigerator equipped with two evaporators concerning this design and raising a pressure so that it may explain below, in order to supply a compressor, a single-loop cycle applicable to a pure refrigerant is constituted, and it is effective in the ability to be able to maximum-ize energy efficiency with the minimum manufacturing cost.

[The best gestalt for devising]

[0015]

Hereafter, it explains to the gestalt of operation of this design using a drawing.

In the 1st operation gestalt of the freezer of the refrigerator equipped with two evaporators concerning this design The compressor 51 into which a refrigerant is made to compress as shown in drawing 1 , and the condenser 53 which makes the refrigerant compressed by this compressor 51 condense, An expansion means 56 for freezer compartments to make the 1st pressure decompress the refrigerant condensed by this condenser 53, An expansion means 58 for cold storage to make the 2nd pressure decompress the refrigerant condensed by said condenser 53, The evaporator 61 for freezer compartments which makes the 1st temperature cool the air which is made to evaporate the refrigerant which expanded with said expansion means 56 for freezer compartments, and is supplied to a freezer compartment 8, The evaporator 63 for cold storage which makes the 2nd temperature cool the air which is made to evaporate the refrigerant which expanded with said expansion means 58 for cold storage, and is supplied to cold storage 9, After mixing the refrigerant which went via said evaporator 61 for freezer compartments, and the refrigerant which went via said evaporator 63 for freezer compartments and raising a pressure, the ejector 65 supplied to said compressor 51 is included, and it is constituted.

[0016]

Here, said expansion means 56 for freezer compartments and the expansion means 58 for cold storage can be constituted by the electronic expansion bulbs 57 and 59, respectively, and can adjust now the flow rate of each refrigerant which moves to said evaporator 61 for freezer compartments, and the evaporator 63 for cold storage from said condenser 53, respectively.

On the other hand, the heat dissipation fan (un-illustrating) for making this condenser 53 radiate heat was prepared in the one side of said condenser 53, the endoergic fan (un-illustrating) for carrying out endoergic [of these evaporators 61 and 63] to the one side of said evaporator 61 for freezer compartments and the evaporator 63 for cold storage was prepared, respectively, and connection

installation of the motor (un-illustrating) which supplies power to said heat dissipation fan and an endoergic fan was carried out, respectively.
[0017]
It is what showed the oil eliminator into which oil is made to separate from a refrigerant so that the non-explained sign 52 may be installed between said compressors 51 and condensers 53 among drawing and only a refrigerant may flow into said condenser 53. The non-explained signs 54 and 55 are installed in the refrigerant outlet side of said condenser 53, and show the dryer from which the moisture included in the refrigerant is removed, and the receiver which adjusts the flow rate of a refrigerant with the load of said freezer compartment 8 and cold storage 9, respectively.
[0018]
And the non-explained signs 68 and 69 are installed in the refrigerant entrance side of said compressor 51, and show the accumulator which separates the refrigerant of a gaseous state, and the refrigerant of a liquid condition so that only the refrigerant of a gaseous state may be inhaled by said compressor 51, and the strainer from which the impurity included in said refrigerant is removed, respectively.
[0019]
Based on drawing 2 , it explains to actuation of the freezer of the refrigerator equipped with two evaporators hereafter applied to this design constituted in this way.
First, the refrigerant of the low-temperature low voltage condition a which flowed into the compressor 51 is compressed by said compressor 51, changes to the steamy condition b of elevated-temperature high pressure, and is inhaled by the condenser 53, and this condenser 53 emits heat and changes the refrigerant of said elevated-temperature high pressure to the liquefied voice c of ordinary temperature high pressure.
[0020]
Subsequently, the refrigerant of ordinary temperature high pressure which went via said condenser 53 An amount is determined by the load set as a freezer compartment 8 and cold storage 9, and it is moved to the expansion means 56 for freezer compartments, and the expansion means 58 for cold storage, respectively. The expansion means 56 for these freezer compartments and the expansion means 58 for cold storage determine the flow rate of a refrigerant that the refrigerant of optimum dose is supplied to the evaporator 61 for freezer compartments, and the evaporator 63 for cold storage according to the load of said freezer compartment 8 and cold storage 9.
[0021]
Subsequently, the refrigerant which went via said expansion means 56 for freezer compartments is decompressed by the condition d1 with the 1st pressure. while the refrigerant which went via said expansion means 58 for cold storage is decompressed by the condition d2 with the 2nd pressure and these refrigerants d1 and d2 go via said expansion means 56 for freezer compartments, and the expansion means 58 for cold storage, respectively -- etc. -- it expands in enthalpy and a liquid and a gas will be 2 phase mixed.
[0022]
Subsequently, the refrigerant which went via the refrigerant and the expansion means 58 for cold storage which went via said expansion means 56 for freezer compartments in this way after flowing into said evaporator 61 for freezer compartments, and the evaporator 63 for cold storage, respectively, it evaporates completely -- having -- ****** -- it changes to the low-temperature low voltage conditions e1 and e2 of having temperature and a pressure, respectively, surrounding heat is taken in this process, and the 1st temperature and the 2nd temperature are made to cool surrounding air
[0023]
Thus, the air cooled by the temperature set as said freezer compartment 8 and cold storage 9 with said evaporator 61 for freezer compartments and the evaporator 63 for cold storage is supplied to said freezer compartment 8 and cold storage 9 via a cold duct (un-illustrating) and a flow regulator (un-illustrating), respectively.
[0024]
At this time, it prevents that the passage of the cold which is cooled with said evaporator 61 for freezer compartments, and is supplied to said freezer compartment 8, the cold which is cooled with

said evaporator 63 for cold storage, and is supplied to said cold storage 9, and ** is separated completely mutually, and the cold of these freezer compartments 8 and the cold of cold storage 9 are mixed.

[0025]

Subsequently, the refrigerant which would be in the gaseous state of low-temperature low voltage while going via said evaporator 61 for freezer compartments and the evaporator 63 for cold storage flows into an ejector 65, mutual mixing is carried out, a pressure rises, and the refrigerant pressurized by the ejector 65 in this way repeats the process which it was again inhaled by said compressor 51 and was mentioned above, and performs it.

[0026]

And in the 2nd operation gestalt of the freezer of the refrigerator equipped with two evaporators concerning this design, as shown in drawing 3 , said expansion means 56 for freezer compartments and the expansion means 58 for cold storage are characterized by being constituted by the combination of two or more capillary tubes 57a, 57b, 57c, 59a, 59b, and 59c. In drawing 3 , although it shows the number of a capillary tube at a time in three pieces for every expansion means, the number can change variously.

[0027]

Thus, said each expansion means 56 and 58 which consist of combination of each of said capillary tubes 57a, 57b, 57c, 59a, 59b, and 59c So that the passage of a refrigerant can be changed with each load set as said freezer compartment 8 and cold storage 9 Mutual branch of each capillary tubes 57a, 57b, 57c, 59a, 59b, and 59c is carried out, and they can also use an orifice in the example of modification of this design instead of said each capillary tubes 57a, 57b, 57c, 59a, 59b, and 59c.

[0028]

That is, in the 2nd operation gestalt of this design, since said each capillary tubes 57a, 57b, 57c, 59a, 59b, and 59c are carrying out mutual branch of each expansion means 56 and 58 which consist of combination of two or more capillary tubes 57a, 57b, 57c, 59a, 59b, and 59c, they can change the passage of a refrigerant according to the load of said freezer compartment 8 and cold storage 9.

[0029]

And as shown in drawing 4 , before it installs the preheater 67 which heats a refrigerant between said ejectors 65 and compressors 51 and a refrigerant is inhaled by this compressor 51, it is made to have raised the temperature of a refrigerant in the 3rd operation gestalt of the freezer of the refrigerator equipped with two evaporators concerning this design.

Said preheater 67 carries out heat exchange of the refrigerant of the low temperature which went via said ejector 65, and the hot refrigerant of each other which went via said condenser 53, and makes the refrigerant which went via said ejector 65 heat here.

[0030]

Thus, if heat exchange of the refrigerant which went via said condenser 53 with said preheater 67, and the refrigerant of each other which went via said ejector 65 is carried out, in order for the refrigerant which went via said condenser 53 to be in a supercooling condition, and to flow into said each expansion means 56 and 58, and for the refrigerant which went via said ejector 65 to be in overheating and to flow into said compressor 51, said preheater 67 raises the energy efficiency of a freezer sharply.

[Brief Description of the Drawings]

[0031]

[Drawing 1] It is the outline block diagram having shown the 1st operation gestalt of the freezer of the refrigerator equipped with two evaporators concerning this design.

[Drawing 2] It is the graph which showed the degree of pressure-enthalpy line of the refrigerating cycle in the freezer of the refrigerator equipped with two evaporators concerning this design.

[Drawing 3] It is the outline block diagram having shown the 2nd operation gestalt of the freezer of the refrigerator equipped with two evaporators concerning this design.

[Drawing 4] It is the outline block diagram having shown the 3rd operation gestalt of the freezer of the refrigerator equipped with two evaporators concerning this design.

[Drawing 5] It is the outline block diagram having shown the freezer of the conventional refrigerator.

This Page Blank (uspto)

[Drawing 6] It is the graph which showed the degree of pressure-enthalpy line of the refrigerating cycle in the freezer of the conventional refrigerator.
[Description of Notations]
[0032]
51 -- Compressor
53 -- Condenser
56 -- Expansion means for freezer compartments
57a, 57b, 57c -- Capillary tube
58 -- Expansion means for cold storage
59a, 59b, 59c -- Capillary tube
61 -- Evaporator for freezer compartments
63 -- Evaporator for cold storage
65 -- Ejector
67 -- Preheater

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Utility model registration claim]
[Claim 1]
The compressor into which a refrigerant is made to compress,
The condenser which makes the refrigerant compressed by said compressor condense,
An expansion means for freezer compartments to make the 1st pressure decompress the refrigerant condensed by said condenser,
An expansion means for cold storage to make the 2nd pressure decompress the refrigerant condensed by said condenser,
The evaporator for freezer compartments which makes the 1st temperature cool the air which is made to evaporate the refrigerant which expanded with said expansion means for freezer compartments, and is supplied to a freezer compartment,
The evaporator for cold storage which makes the 2nd temperature cool the air which is made to evaporate the refrigerant which expanded with said expansion means for cold storage, and is supplied to cold storage,
The freezer of the refrigerator equipped with two evaporators characterized by including the ejector supplied to said compressor and being constituted after mixing the refrigerant which went via said evaporator for freezer compartments, and the refrigerant which went via said evaporator for freezer compartments and raising a pressure.
[Claim 2]
Said expansion means for freezer compartments and the expansion means for cold storage are the freezer of the refrigerator equipped with two evaporators according to claim 1 characterized by being constituted by the electronic expansion bulb, respectively.
[Claim 3]
Said expansion means for freezer compartments and the expansion means for cold storage are the freezer of the refrigerator equipped with two evaporators according to claim 1 characterized by being constituted by the combination of two or more capillary tubes, respectively.
[Claim 4]
Said expansion means for freezer compartments is the freezer of the refrigerator equipped with two evaporators according to claim 1 characterized by being constituted by the electronic expansion bulb and said expansion means for cold storage being constituted by the combination of two or more capillary tubes.
[Claim 5]
It is the freezer of the refrigerator equipped with two evaporators according to claim 1 characterized by for said expansion means for freezer compartments being constituted by the combination of two or more capillary tubes, and constituting said expansion means for cold storage by the electronic expansion bulb.
[Claim 6]
The freezer of the refrigerator equipped with two evaporators according to claim 1 characterized by forming a preheater between said ejectors and compressors.
[Claim 7]
The freezer of the refrigerator equipped with two evaporators according to claim 6 characterized by performing heat exchange between the refrigerant of the low temperature which went via said

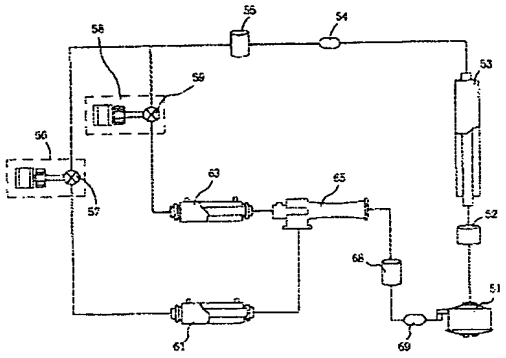
ejector, and the hot refrigerant which went via said condenser in said preheater.

[Translation done.]

Drawing selection Representative drawing

図１

本考案に係る２個の蒸発器を備えた冷蔵庫の冷凍装置の第１実施形態を示した概略構成図



51…圧縮機
52…オイル分離器
53…凝縮器
54…ドライヤー
55…受液器
56…冷凍室用膨張手段
57，59…電子膨張バルブ
58…冷蔵室用膨張手段
61…冷凍室用蒸発器
63…冷蔵室用蒸発器
65…エゼクタ
68…アキュムレータ
69…ストレーナ

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[0031]
[Drawing 1] It is the outline block diagram having shown the 1st operation gestalt of the freezer of the refrigerator equipped with two evaporators concerning this design.
[Drawing 2] It is the graph which showed the degree of pressure-enthalpy line of the refrigerating cycle in the freezer of the refrigerator equipped with two evaporators concerning this design.
[Drawing 3] It is the outline block diagram having shown the 2nd operation gestalt of the freezer of the refrigerator equipped with two evaporators concerning this design.
[Drawing 4] It is the outline block diagram having shown the 3rd operation gestalt of the freezer of the refrigerator equipped with two evaporators concerning this design.
[Drawing 5] It is the outline block diagram having shown the freezer of the conventional refrigerator.

[Drawing 6] It is the graph which showed the degree of pressure-enthalpy line of the refrigerating cycle in the freezer of the conventional refrigerator.

[Translation done.]

(19)日本国特許庁(JP)　(12)登録実用新案公報(U)　(11)実用新案登録番号
実用新案登録第3102651号
(U3102651)
(45)発行日　平成16年7月15日(2004.7.15)　(24)登録日　平成16年4月14日(2004.4.14)

(51)Int.Cl.[7]　F I
F25B 5/02　F25B 5/02　530B
F25B 1/00　F25B 1/00　331Z
F25D 11/02　F25D 11/02　A

評価書の請求 未請求　請求項の数 7　OL　(全 9 頁)

(21)出願番号　実願2004-2(U2004-2)
(22)出願日　平成16年1月5日(2004.1.5)
出願変更の表示　特願2000-319292(P2000-319292)の変更
原出願日　平成12年10月19日(2000.10.19)
(31)優先権主張番号　45377/1999
(32)優先日　平成11年10月19日(1999.10.19)
(33)優先権主張国　韓国(KR)

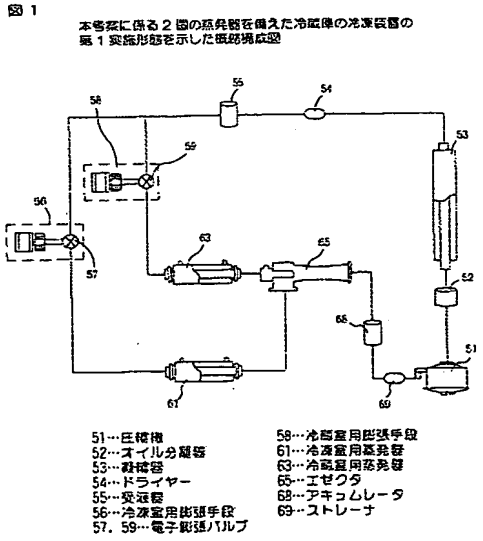
(73)実用新案権者　590001669
エルジー電子株式会社
大韓民国，ソウル特別市永登浦区汝矣島洞２０
(74)代理人　100077517
弁理士　石田　敬
(74)代理人　100092624
弁理士　鶴田　準一
(74)代理人　100082898
弁理士　西山　雅也
(74)代理人　100081330
弁理士　樋口　外治

最終頁に続く

(54)【考案の名称】２個の蒸発器を備えた冷蔵庫の冷凍装置

(57)【要約】
【課題】　単一ループサイクルを構成して、最小限の費用でエネルギー効率を極大化し得る２個の蒸発器を有する冷蔵庫の冷凍装置を提供しようとする。
【解決手段】　冷媒を圧縮させる圧縮機５１と、冷媒を凝縮させる凝縮器５３と、冷媒を第１圧力に減圧させる冷凍室用膨張手段５６と、冷媒を第２圧力に減圧させる冷蔵室用膨張手段５８と、前記冷凍室用膨張手段５６により膨張された冷媒を気化させて、冷凍室８に供給される空気を第１温度に冷却させる冷凍室用蒸発器６１と、前記冷蔵室用膨張手段５８により膨張された冷媒を気化させて、冷蔵室９に供給される空気を第２温度に冷却させる冷蔵室用蒸発器６３と、前記冷凍室用蒸発器６１及び冷凍室用蒸発器６３をそれぞれ経由した冷媒を混合して圧力を上昇させた後、前記圧縮機５１に供給するエゼクタ６５と、を包含して、２個の蒸発器を備えた冷蔵庫の冷凍装置を構成する。
【選択図】　図１

図１



【実用新案登録請求の範囲】
【請求項１】
冷媒を圧縮させる圧縮機と、
前記圧縮機により圧縮された冷媒を凝縮させる凝縮器と、
前記凝縮器により凝縮された冷媒を第１圧力に減圧させる冷凍室用膨張手段と、
前記凝縮器により凝縮された冷媒を第２圧力に減圧させる冷蔵室用膨張手段と、
前記冷凍室用膨張手段により膨張された冷媒を気化させて、冷凍室に供給される空気を第１温度に冷却させる冷凍室用蒸発器と、
前記冷蔵室用膨張手段により膨張された冷媒を気化させて、冷蔵室に供給される空気を第２温度に冷却させる冷蔵室用蒸発器と、
前記冷凍室用蒸発器を経由した冷媒と、前記冷凍室用蒸発器を経由した冷媒と、を混合して圧力を上昇させた後、前記圧縮機に供給するエゼクタと、を包含して構成されることを特徴とする２個の蒸発器を備えた冷蔵庫の冷凍装置。
【請求項２】
前記冷凍室用膨張手段及び冷蔵室用膨張手段は、それぞれ電子膨張バルブにより構成されることを特徴とする請求項１記載の２個の蒸発器を備えた冷蔵庫の冷凍装置。
【請求項３】
前記冷凍室用膨張手段及び冷蔵室用膨張手段は、それぞれ複数個の毛細管の組合せにより構成されることを特徴とする請求項１記載の２個の蒸発器を備えた冷蔵庫の冷凍装置。
【請求項４】
前記冷凍室用膨張手段は電子膨張バルブにより構成され、前記冷蔵室用膨張手段は複数個の毛細管の組合せにより構成されることを特徴とする請求項１記載の２個の蒸発器を備えた冷蔵庫の冷凍装置。
【請求項５】
前記冷凍室用膨張手段は複数個の毛細管の組合せにより構成され、前記冷蔵室用膨張手段は電子膨張バルブにより構成されることを特徴とする請求項１記載の２個の蒸発器を備えた冷蔵庫の冷凍装置。
【請求項６】
前記エゼクタと圧縮機間には予熱器が設けられることを特徴とする請求項１記載の２個の蒸発器を備えた冷蔵庫の冷凍装置。
【請求項７】
前記予熱器では、前記エゼクタを経由した低温の冷媒と前記凝縮器を経由した高温の冷媒間の熱交換が行われることを特徴とする請求項６記載の２個の蒸発器を備えた冷蔵庫の冷凍装置。

【考案の詳細な説明】
【技術分野】
【０００１】
本考案は、２個の蒸発器を備えた冷蔵庫の冷凍装置に係るもので、詳しくは、冷凍室用蒸発器を経由した冷媒と冷蔵室用蒸発器を経由した冷媒とがエゼクタを経由しながら混合されて圧力上昇された後、圧縮機に供給されることを特徴とする、２個の蒸発器を備えた冷蔵庫の冷凍装置に関するものである。

【背景技術】
【０００２】
従来、冷蔵庫の冷凍装置においては、図５に示したように、冷媒を圧縮させて高温高圧の蒸気状態に変換させる圧縮機１と、該圧縮機１により高温高圧の蒸気状態となった冷媒を周囲の空気と熱交換させることによって高圧の液状態に凝縮させると同時に、前記周囲の空気の温度を上昇させる凝縮器２と、該凝縮器２により高圧の液状態となった冷媒を減圧させ、蒸発されやすい状態に変換させる膨張機構４と、前記膨張機構４を経由した冷媒を周囲の空気と熱交換させることによって低温低圧の蒸気状態に変換させると同時に、前記周囲の空気の温度を下降させる蒸発器５と、を包含して構成されていた。

【０００３】

ここで、前記圧縮機１及び凝縮器２は冷蔵庫の機械室（未図示）に収納され、前記凝縮器２の一方側には該凝縮器２を放熱させるための放熱ファン３と、該放熱ファン３に動力を供給するモータ７と、がそれぞれ装着されていた。

又、前記蒸発器５は、冷蔵庫の冷凍室８の後方側に装着されて前記冷凍室８及び冷蔵室９に冷気を供給し、前記蒸発器５の一方側には該蒸発器５を吸熱させるための冷凍ファン６と、該冷凍ファン６に動力を供給するモータ１０と、がそれぞれ装着されていた。

【０００４】

以下、このように構成された従来の冷蔵庫の冷凍装置の動作に対し、図６に基づいて説明する。

先ず、圧縮機１に流入された低温低圧状態ａの冷媒は、前記圧縮機１により圧縮されて高温高圧の蒸気状態ｂに変化されて凝縮器２に吸入され、該凝縮器２は熱を放出して前記高温高圧の冷媒を常温高圧の液状態ｃまたはｃｆに変化させる。

次いで、前記凝縮器２により凝縮された常温高圧の冷媒は膨張機構４を経由しながらその一部が減圧され、等エンタルピー的に膨張されて、液体と気体とが混合された２相状態ｄになる。

【０００５】

次いで、蒸発器５に吸入された前記２相状態の冷媒ｄは完全に気化されて低温低圧状態ａまたはａｇに変化され、この過程で回りの熱を奪って周囲を冷却させる。

次いで、前記蒸発器５により冷却された空気が冷気ダクト（未図示）及び流量調節器（未図示）を経由して冷凍室８及び冷蔵室９にそれぞれ流入されるため、それら冷凍室８及び冷蔵室９はそれぞれ－１８℃及び－４℃と一定した温度を維持することができる。

【０００６】

併し、このような従来の冷蔵庫の冷凍装置においては、冷凍室の後方側に設置された１個の蒸発器のみを使用して冷凍室及び冷蔵室を相互異なる温度で冷却させるため、前記蒸発器における冷媒の蒸発圧力を冷蔵室の温度よりも低い冷凍室の飽和温度に該当する圧力に合わせる必要があるため、蒸発器と凝縮器間の圧力差が大きくなり、圧縮機が過負荷状態になって、冷蔵庫のエネルギー効率が低下するという不都合な点があった。

【０００７】

且つ、従来の冷蔵庫の冷凍装置においては、前記蒸発器により冷却された空気を冷凍室及び冷蔵室に分配して供給する過程で、それら冷凍室及び冷蔵室の空気が相互混合されるため、冷蔵室の水分及び食品の臭いが冷凍室に流入されて、冷蔵庫内部の快適性が低下するという不都合な点があった。

【０００８】

また、従来の冷蔵庫の冷凍装置においては、冷蔵室から流入された水分が非常に温度の低い蒸発器の表面で霜層を形成するため、前記蒸発器の熱伝達効率が低下されると共に、前記蒸発器を経由する風量を減少させるという不都合な点があった。

【０００９】

更に、従来の冷蔵庫の冷凍装置においては、上述したように蒸発器の表面に形成される霜層を除去するために、通常、電気ヒータを使用する除霜装置を備えるため、該電気ヒータの電力消費量が冷蔵庫全体の電力消費量の約５～１０％程度を占めるため、装置効率が低下するという不都合な点があった。

以上のような問題点を解決するための方案として、２個の蒸発器を備えた冷凍装置が開発され、その代表的な例としては、２重ループサイクル及び単一ループサイクルが挙げられていた。

【００１０】

然るに、前記２重ループサイクルにおいては、相互に異なる蒸発温度を有する２個の独立的冷凍装置により構成されたもので、冷蔵室のサイクルにおいて、高い蒸発圧力が発生して凝縮器との圧力差が減少して、圧縮機の負荷が著しく減少するため、エネルギー効率の面では有利であるが、前記圧縮機及び蒸発器をそれぞれ２個ずつ使用する必要があるた

め、装置の製造単価が上昇して効用性が低下するという不都合な点があった。

【００１１】

また、ローレンツーモイツナーサイクル（Ｌｏｒｅｎｔ－Ｍｅｕｔｚｎｅｒ　ｃｙｃｌｅ）として代表される単一ループサイクルにおいては、１個の圧縮機及び２個の蒸発器を使用するもので、１個の蒸発器を追加設ければ済むため、製造単価の増加による効用性低下の問題は解決できるものの、混合冷媒のみに適用可能であるため、使用可能な混合冷媒を開発した後、該混合冷媒を低廉に普及する必要があるという先決課題を有するという不都合な点があった。

【考案の開示】

【考案が解決しようとする課題】

【００１２】

本考案は、このような従来の課題に鑑みてなされたもので、冷凍室用蒸発器を経由した冷媒と冷蔵室用蒸発器を経由した冷媒とを混合し、圧力を上昇させた後、圧縮機に供給することによって、混合冷媒だけではなく純粋冷媒にも適用可能な単一ループサイクルを構成して、最小限の費用でエネルギー効率を極大化し得る２個の蒸発器を有する冷蔵庫の冷凍装置を提供することを目的とする。

【課題を解決するための手段】

【００１３】

このような目的を達成するため、本考案に係る２個の蒸発器を備える冷蔵庫の冷凍装置においては、冷媒を圧縮させる圧縮機と、前記圧縮機により圧縮された冷媒を凝縮させる凝縮器と、前記凝縮器により凝縮された冷媒を第１圧力に減圧させる冷凍室用膨張手段と、前記凝縮器により凝縮された冷媒を第２圧力に減圧させる冷蔵室用膨張手段と、前記冷凍室用膨張手段により膨張された冷媒を気化させて、冷凍室に供給される空気を第１温度に冷却させる冷凍室用蒸発器と、前記冷蔵室用膨張手段により膨張された冷媒を気化させて、冷蔵室に供給される空気を第２温度に冷却させる冷蔵室用蒸発器と、前記冷凍室用蒸発器を経由した冷媒と、前記冷凍室用蒸発器を経由した冷媒とを混合して圧力を上昇させた後、前記圧縮機に供給するエゼクタと、を包含して構成されている。

【考案の効果】

【００１４】

以下に説明するように、本考案に係る２個の蒸発器を備えた冷蔵庫の冷凍装置においては、冷凍室用蒸発器を経由した冷媒と、冷蔵室用蒸発器を経由した冷媒と、をエゼクタにより混合させ、圧力を上昇させた後、圧縮機に供給するようになっているため、純粋冷媒に適用可能な単一ループサイクルを構成して、最小限の製造コストでエネルギー効率を極大化し得るという効果がある。

【考案を実施するための最良の形態】

【００１５】

以下、本考案の実施の形態に対し、図面を用いて説明する。

本考案に係る２個の蒸発器を備えた冷蔵庫の冷凍装置の第１実施形態においては、図１に示したように、冷媒を圧縮させる圧縮機５１と、該圧縮機５１により圧縮された冷媒を凝縮させる凝縮器５３と、該凝縮器５３により凝縮された冷媒を第１圧力に減圧させる冷凍室用膨張手段５６と、前記凝縮器５３により凝縮された冷媒を第２圧力に減圧させる冷蔵室用膨張手段５８と、前記冷凍室用膨張手段５６により膨張された冷媒を気化させて、冷凍室８に供給される空気を第１温度に冷却させる冷凍室用蒸発器６１と、前記冷蔵室用膨張手段５８により膨張された冷媒を気化させて、冷蔵室９に供給される空気を第２温度に冷却させる冷蔵室用蒸発器６３と、前記冷凍室用蒸発器６１を経由した冷媒と前記冷凍室用蒸発器６３を経由した冷媒とを混合して圧力を上昇させた後、前記圧縮機５１に供給するエゼクタ６５と、を包含して構成されている。

【００１６】

ここで、前記冷凍室用膨張手段５６及び冷蔵室用膨張手段５８は、それぞれ電子膨張バルブ５７、５９により構成されて、前記凝縮器５３から前記冷凍室用蒸発器６１及び冷蔵

室用蒸発器６３にそれぞれ移動する各冷媒の流量を調節し得るようになっている。

一方、前記凝縮器５３の一方側には該凝縮器５３を放熱させるための放熱ファン（未図示）が設けられ、前記冷凍室用蒸発器６１及び冷蔵室用蒸発器６３の一方側にはそれら蒸発器６１、６３を吸熱させるための吸熱ファン（未図示）がそれぞれ設けられ、前記放熱ファン及び吸熱ファンには動力を供給するモータ（未図示）がそれぞれ連結設置されていた。

【００１７】

図中、未説明符号５２は、前記圧縮機５１と凝縮器５３間に設置されて、前記凝縮器５３に冷媒のみが流入されるように冷媒からオイルを分離させるオイル分離器を示したもので、未説明符号５４及び５５は、前記凝縮器５３の冷媒出口側に設置されて、冷媒中に包含された水分を除去するドライヤーと、前記冷凍室８及び冷蔵室９の負荷によって冷媒の流量を調節する受液器と、をそれぞれ示したものである。

【００１８】

且つ、未説明符号６８及び６９は、前記圧縮機５１の冷媒入口側に設置されて、前記圧縮機５１に気体状態の冷媒のみが吸入されるように気体状態の冷媒と液体状態の冷媒とを分離するアキュムレータと、前記冷媒中に包含された不純物を除去するストレーナと、をそれぞれ示したものである。

【００１９】

以下、このように構成された本考案に係る２個の蒸発器を備えた冷蔵庫の冷凍装置の動作に対し、図２に基づいて説明する。

先ず、圧縮機５１に流入された低温低圧状態ａの冷媒は、前記圧縮機５１により圧縮されて高温高圧の蒸気状態ｂに変化されて凝縮器５３に吸入され、該凝縮器５３は熱を放出して前記高温高圧の冷媒を常温高圧の液状態ｃに変化させる。

【００２０】

次いで、前記凝縮器５３を経由した常温高圧の冷媒は、冷凍室８及び冷蔵室９に設定された負荷により量が決定されて、冷凍室用膨張手段５６及び冷蔵室用膨張手段５８にそれぞれ移動され、それら冷凍室用膨張手段５６及び冷蔵室用膨張手段５８は、前記冷凍室８及び冷蔵室９の負荷に応じて冷凍室用蒸発器６１及び冷蔵室用蒸発器６３に適量の冷媒が供給されるように冷媒の流量を決定する。

【００２１】

次いで、前記冷凍室用膨張手段５６を経由した冷媒は第１圧力を有した状態ｄ１に減圧され、前記冷蔵室用膨張手段５８を経由した冷媒は第２圧力を有した状態ｄ２に減圧され、それら冷媒ｄ１、ｄ２はそれぞれ前記冷凍室用膨張手段５６及び冷蔵室用膨張手段５８を経由しながら等エンタルピー的に膨張されて、液体と気体とが混合された２相状態になる。

【００２２】

次いで、このように前記冷凍室用膨張手段５６を経由した冷媒及び冷蔵室用膨張手段５８を経由した冷媒は、前記冷凍室用蒸発器６１及び冷蔵室用蒸発器６３にそれぞれ流入された後、完全に気化されて、相互異なる温度及び圧力を有する低温低圧状態ｅ１、ｅ２にそれぞれ変化され、この過程で回りの熱を奪って周囲の空気を第１温度及び第２温度に冷却させる。

【００２３】

このように前記冷凍室用蒸発器６１及び冷蔵室用蒸発器６３により前記冷凍室８及び冷蔵室９に設定された温度に冷却された空気は、冷気ダクト（未図示）及び流量調節器（未図示）を経由してそれぞれ前記冷凍室８及び冷蔵室９に供給される。

【００２４】

このとき、前記冷凍室用蒸発器６１により冷却されて前記冷凍室８に供給される冷気と、前記冷蔵室用蒸発器６３により冷却されて前記冷蔵室９に供給される冷気と、の流路は互いに完全に分離されて、それら冷凍室８の冷気と冷蔵室９の冷気とが混合されることを防止する。

【００２５】

次いで、前記冷凍室用蒸発器６１及び冷蔵室用蒸発器６３を経由しながら低温低圧の気体状態になった冷媒は、エゼクタ６５に流入されて相互混合されて圧力が上昇され、このようにエゼクタ６５により加圧された冷媒は再び前記圧縮機５１に吸入されて上述した過程を反復して行う。

【００２６】

そして、本考案に係る２個の蒸発器を備えた冷蔵庫の冷凍装置の第２実施形態においては、図３に示したように、前記冷凍室用膨張手段５６及び冷蔵室用膨張手段５８が、複数個の毛細管５７ａ、５７ｂ、５７ｃ、５９ａ、５９ｂ、５９ｃの組合せにより構成されることを特徴とする。図３では、毛細管の個数を各膨張手段毎に３個ずつに示しているが、その数は多様に変化することができる。

【００２７】

このように前記各毛細管５７ａ、５７ｂ、５７ｃ、５９ａ、５９ｂ、５９ｃの組合せからなる前記各膨張手段５６、５８は、前記冷凍室８及び冷蔵室９に設定されてあるそれぞれの負荷によって冷媒の流路を変更し得るように、各毛細管５７ａ、５７ｂ、５７ｃ、５９ａ、５９ｂ、５９ｃが相互分岐されており、本考案の変更例においては、前記各毛細管５７ａ、５７ｂ、５７ｃ、５９ａ、５９ｂ、５９ｃの代わりにオリフィスを使用することもできる。

【００２８】

即ち、本考案の第２実施形態においては、複数個の毛細管５７ａ、５７ｂ、５７ｃ、５９ａ、５９ｂ、５９ｃの組合せからなる各膨張手段５６、５８は、前記各毛細管５７ａ、５７ｂ、５７ｃ、５９ａ、５９ｂ、５９ｃが相互分岐しているため、前記冷凍室８及び冷蔵室９の負荷に応じて冷媒の流路を変更することができる。

【００２９】

且つ、本考案に係る２個の蒸発器を備えた冷蔵庫の冷凍装置の第３実施形態においては、図４に示したように、冷媒を加熱する予熱器６７を前記エゼクタ６５と圧縮機５１間に設置して、該圧縮機５１に冷媒が吸入される以前に冷媒の温度を上昇させるようにしてある。

ここで、前記予熱器６７は、前記エゼクタ６５を経由した低温の冷媒と前記凝縮器５３を経由した高温の冷媒とを互いに熱交換させて、前記エゼクタ６５を経由した冷媒を加熱させるようになっている。

【００３０】

このように前記予熱器６７により前記凝縮器５３を経由した冷媒と前記エゼクタ６５を経由した冷媒とが互いに熱交換されると、前記凝縮器５３を経由した冷媒は過冷状態になって前記各膨張手段５６、５８に流入され、前記エゼクタ６５を経由した冷媒は過熱状態になって前記圧縮機５１に流入されるため、前記予熱器６７は冷凍装置のエネルギー効率を大幅に向上させる。

【図面の簡単な説明】

【００３１】

【図１】本考案に係る２個の蒸発器を備えた冷蔵庫の冷凍装置の第１実施形態を示した概略構成図である。

【図２】本考案に係る２個の蒸発器を備えた冷蔵庫の冷凍装置における冷凍サイクルの圧力ーエンタルピー線度を示したグラフである。

【図３】本考案に係る２個の蒸発器を備えた冷蔵庫の冷凍装置の第２実施形態を示した概略構成図である。

【図４】本考案に係る２個の蒸発器を備えた冷蔵庫の冷凍装置の第３実施形態を示した概略構成図である。

【図５】従来の冷蔵庫の冷凍装置を示した概略構成図である。

【図６】従来の冷蔵庫の冷凍装置における冷凍サイクルの圧力ーエンタルピー線度を示したグラフである。

【考案の詳細な説明その他】【符号の説明】

【００３２】

５１…圧縮機

５３…凝縮器

５６…冷凍室用膨張手段

５７ａ、５７ｂ、５７ｃ…毛細管

５８…冷蔵室用膨張手段

５９ａ、５９ｂ、５９ｃ…毛細管

６１…冷凍室用蒸発器

６３…冷蔵室用蒸発器

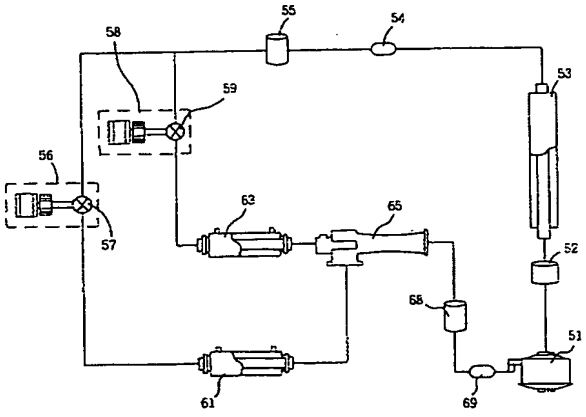
６５…エゼクタ

６７…予熱器

【図１】

図 1

本考案に係る２個の蒸発器を備えた冷蔵庫の冷凍装置の第１実施形態を示した概略構成図

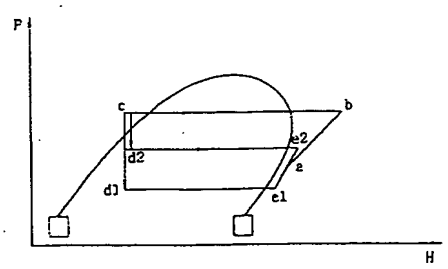


51…圧縮機
52…オイル分離器
53…凝縮器
54…ドライヤー
55…受液器
56…冷凍室用膨張手段
57．59…電子膨張バルブ
58…冷蔵室用膨張手段
61…冷凍室用蒸発器
63…冷蔵室用蒸発器
65…エゼクタ
68…アキュムレータ
69…ストレーナ

【図２】

図 2

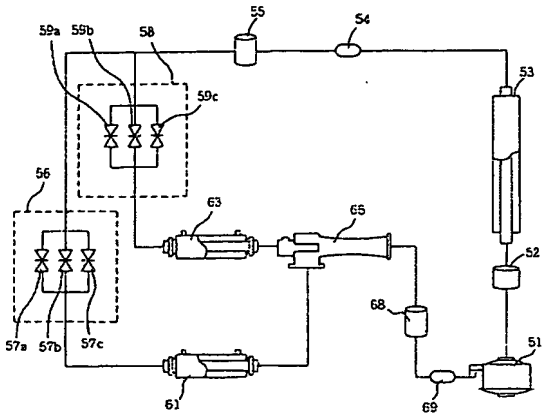
本考案に係る２個の蒸発器を備えた冷蔵庫の冷凍装置における冷凍サイクルの圧力-エンタルピー線度を示したグラフ



【図３】

図 3

本考案に係る２個の蒸発器を備えた冷蔵庫の冷凍装置の第２実施形態を示した概略構成図

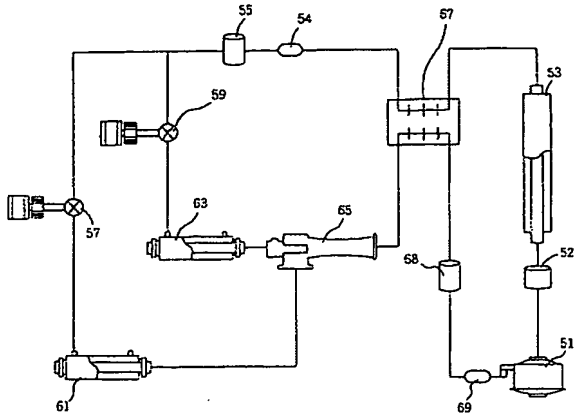


51…圧縮機
52…オイル分離器
53…凝縮器
54…ドライヤー
55…受液器
56…冷凍室用膨張手段
57a，b，c…毛細管
58…冷蔵室用膨張手段
59a，b，c…毛細管
61…冷凍室用蒸発器
63…冷蔵室用蒸発器
65…エゼクタ
68…アキュムレータ
69…ストレーナ

【図４】

図 4

本考案に係る２個の蒸発器を備えた冷蔵庫の冷凍装置の第３実施形態を示した概略構成図

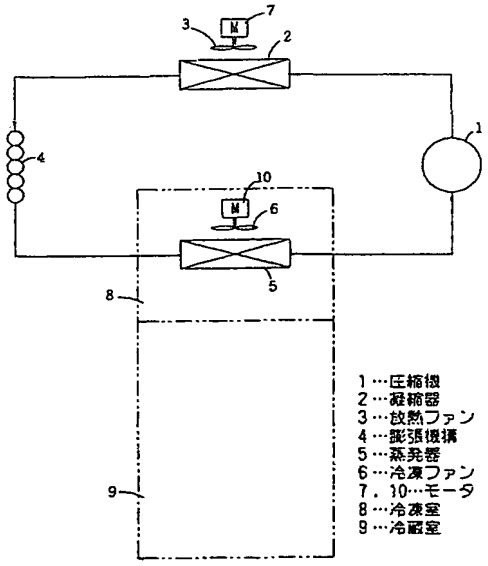


51…圧縮機
52…オイル分離器
53…凝縮器
54…ドライヤー
55…受液器
57，59…電子膨張バルブ
61…冷凍室用蒸発器
63…冷蔵室用蒸発器
65…エゼクタ
67…予熱器
68…アキュムレータ
69…ストレーナ

【図５】

図 5

従来の冷蔵庫の冷凍装置を示した概略構成図

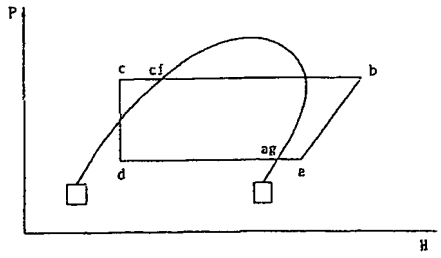


1…圧縮機
2…凝縮器
3…放熱ファン
4…膨張機構
5…蒸発器
6…冷凍ファン
7，10…モータ
8…冷凍室
9…冷蔵室

【図６】

図 6

従来の冷蔵庫の冷凍装置における冷凍サイクルの圧力-エンタルピー線度を示したグラフ



フロントページの続き

(72)考案者　リー　ウォン　ヒー
大韓民国，ソウル，セオデムーンーク，ヒュンジェオードン，１０１，ドクリムーンケクドン　アパートメント　１０５－１００４

(72)考案者　フワン　イル　ナン
大韓民国，キュンキード，アンサン，スンブ　２－ドン，４４１，ジュコン　アパートメント　１０１７－１０８